

Remarks/Arguments:

Claims 1-3, 5-23 and 25, 27-34 remain in this application. Claims 4, 24 and 26 were cancelled. Claims 2, 12, 14, 18, 23, 25, 29, 31 and 34 were amended herein.

The current Office Action rejects the pending claims as being unpatentable over *Nagai* (US6160349), *Miyazaki et al.* (US5909199, hereinafter *Miyazaki*), and/or *Nagai* in view of *Miyazaki*. The Applicant disagrees as the cited reference, whether taken individually or in combination, do not teach, suggest or motivate all of the recitations of any of the rejected claims as amended herein.

It should first be noted that it is improper to combine *Miyazaki* and *Nagai* in that each is directed to solving a problem not found in the other, and they utilize incompatible discharge methods. As such, there is no reason to combine them, and combining them would change the principal of operation of one or the other, and/or would also render one or the other unsuitable for its intended purpose. Despite the impropriety of combining them, the Office Action asserts that the references should be combined to reduce the duration of sustain pulses to suppress any undesirable discharge. However, *Nagai* would not benefit from reducing the duration of the sustain pulse, and in fact teaches against such a reduction in that it teaches the use of pulses of equal duration.

Even if combining them were proper, combination of the cited references does not make up for the inadequacies of the references taken individually. At least some of these inadequacies are specifically identified below.

Claim 1 recites in part: "wherein a pulse waveform of each sustain pulse is determined so that a particular current waveform is formed when the sustain pulse is applied, the particular current waveform being a waveform in which a time from when a peak is reached to when a fall is completed is no more than triple a time from when a rise is started to when the peak is reached." *Nagai*, however, is silent in regard to the current waveform produced. Although it does talk about voltage waveforms to be applied to electrodes, it is impossible to predict the resultant current waveforms. It should be noted that in the claimed invention the sustain pulses are applied to the discharge cells, and the current waveform is the waveform produced in each of the

discharge cells as a result of the applied voltage waveform. Although it may be possible to predict the current waveform resulting from a particular voltage waveform in a solid-state circuit, the discharge cells are not solid-state circuits. In the case of PDPs that produce gas discharge, even when the same voltage waveform is applied to differently constructed PDPs the resultant current waveforms vary greatly depending on panel construction. Therefore it is impossible to predict what current waveform will be generated if the voltage waveform shown in Figure 15 of *Nagai* is applied. As such, *Nagai* does not teach, suggest or motivate the recitations of claim 1, and this inadequacy is not overcome by using *Miyazaki* in place of or in combination with *Nagai*.

Claim 2, as amended herein, recites in part: "wherein immediately before a leading edge of each sustain pulse which is applied to the discharge cell, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse to the discharge cell for a predetermined period that is no more than 100 ns". It should first be observed that the Office Action is silent in regard to how *Nagai* is supposed to satisfy the recitations of claim 2, but the rejection of claim 2 is lumped together with that of claim 1 which differs substantially from claim 2. As such, the Office Action provides no basis for the rejection of claim 2. Moreover, the cited references do not provide a proper basis for rejecting claim 2.

Nagai does utilize sustain pulses that alternate in polarity, but does not teach that adjacent pulses occur immediately before or after each other. As shown in figure 15, there is a substantial delay between pulses. Moreover, *Nagai* does not teach, suggest, or motivate the use of pulses having opposite polarities in addition to the sustain pulses. However, on the chance that the Office Action contemplates that adjacent sustain pulses satisfy the recitation of claim 2, and that the pulses shown in figure 15 of *Nagai* occur immediately before and after each other, claim 2 has been amended to more clearly distinguish the applied pulse that is opposite in polarity from a preceding sustain pulse by requiring that the pulse be applied for not more than 100 ns, a time period substantially shorter than the duration of each sustain pulse. As such, *Nagai* does not teach, suggest or motivate the recitations of claim 1, and this inadequacy is not overcome by using *Miyazaki* in place of or in combination with *Nagai*.

Miyazaki does not make up for the inadequacy of *Nagai* because it does not teach, suggest, or motivate the use of pulses having opposite polarities. Although the Office Action seems to assert

that figures 10A and 10B illustrate application of pulses opposite in polarity, the figures depict only changes in amplitude resulting from application of a constant current, not application of pulses opposite in polarity. Moreover, the Office Action implicitly acknowledges (in section 7 and by its citation of *Nagai*) that *Miyazaki* does not teach the use of pulses alternating in polarity.

Claim 3, 5 and 6 are at least patentable because of their dependence on claim 2. Moreover, the recitation in claim five shortening the duration, and the recitation in claim 6 regarding voltage difference further distinguish the claimed invention from the cited references.

Claim 7 recites in part: "successively applies a plurality of sustain pulses which alternate in polarity" and "wherein immediately before a leading edge of at least a sustain pulse of the plurality of sustain pulses which is first applied to the discharge cell, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, to the discharge cell for a predetermined period." As already discussed in regard to claim 2, *Miyazaki* does satisfy these recitations because it does not teach, suggest, or motivate the use of pulses having opposite polarities. Although the Office Action asserts that figures 10A and 10B illustrate application of pulses opposite in polarity, the figures depict only changes in amplitude resulting from application of a constant current, not application of pulses opposite in polarity. Moreover, the Office Action implicitly acknowledges (in section 7 and by its citation of *Nagai*) that *Miyazaki* does not teach the use of pulses alternating in polarity.

Claim 8, 9, 10 and 11 are at least patentable because of their dependence on claim 7. Moreover, the recitation in claims 9 and 10 specifying a short duration, and the recitation in claim 11 regarding voltage difference further distinguish the claimed invention from the cited references.

Claim 12, as amended herein, recites in part: "wherein immediately before a leading edge of each sustain pulse which is applied between the pair of first and second electrodes, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, between the pair of first and second electrodes for a predetermined period that is no more than 100 ns." This recitation is sufficiently similar to that of claim 2 that the inadequacies of the cited reference in regard to claim 2 are equally applicable to claim 12. As such, claim 12 is patentable over the cited references. Claim 13 is patentable at least because of its dependence on claim 12.

Claim 14, as amended herein, recites in part: "wherein immediately before a leading edge of at least a sustain pulse of the plurality of sustain pulses which is first applied between the pair of first and second electrodes, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, between the pair of first and second electrodes for a predetermined period that is no more than 100 ns." This recitation is sufficiently similar to that of claim 2 that the inadequacies of the cited reference in regard to claim 2 are equally applicable to claim 14. As such, claim 14 is patentable over the cited references. Claim 15 is patentable at least because of its dependence on claim 14.

Claim 15 recites in part: " wherein an absolute value of a voltage of each sustain pulse which is applied to the discharge cell is higher during a first period than a second period, the first period being a fixed period from a leading edge of the sustain pulse, and the second period being a period from a lapse of the fixed period to a trailing edge of the sustain pulse." This recitation is not addressed by the Office Action, presumably because *Nagai* teaches against such sustain pulses. In *Nagai*, sustain pulse voltages are maintained constant for the duration of the pulse, and are applied to maintain constant average voltage between electrodes. As such *Nagai* does not render claim 15 unpatentable, and the inadequacy of *Nagai* is not made up by *Miyazaki* as *Miyazaki* does not teach, suggest, or motivate sustain pulses having a higher initial voltage.

Claim 16 recites in part: " a highest absolute value of the voltage of the sustain pulse in the first period exceeds an absolute value of a discharge firing voltage of the discharge cell, and the absolute value of the voltage of the sustain pulse in the second period is below the absolute value of the discharge firing voltage of the discharge cell." This recitation is not addressed by the Office Action, presumably because none of the cited references teach or suggest sustain pulses having a higher initial value let alone initial and subsequent values that are greater and lower than the discharge firing voltage of the discharge cell. As such, claim 16 is patentable over the cited references.

Claim 17 is patentable over the cited references at least because of its dependence on claim 16, but also because it limits the duration of the initial voltage of the pulse. As previously discussed the combination of the references is improper, and even if it were not, the combination described

in the Office Action would still not satisfy the recitations of claim 17 in regard to the having a different voltage at the start of the sustain pulse.

Claim 18, as amended herein, is patentable over the cited references at least because of its dependence on claim 15, but also because it recites "immediately after the trailing edge of the sustain pulse, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, to the discharge cell for a predetermined period that is no more than 100 ns." As such, not only does the amplitude of the sustain pulse vary, but it is immediately followed by a short pulse opposite in polarity. This recitation is not addressed by the Office Action, and is not taught, suggested, or motivated by any of the cited references.

Claim 19 recites in part: "wherein an absolute value of a voltage of at least a sustain pulse of the plurality of sustain pulses which is first applied to the discharge cell is higher during a first period than a second period, the first period being a fixed period from a leading edge of the sustain pulse, and the second period being a period from a lapse of the fixed period to a trailing edge of the sustain pulse." This recitation is sufficiently similar to that of claim 15 that the inadequacies of the cited references in regard to claim 15 are equally applicable to claim 19. As such, claim 19 is patentable over the cited references.

Claim 20 recites in part: "wherein a highest absolute value of the voltage of the sustain pulse in the first period exceeds an absolute value of a discharge firing voltage of the discharge cell, and the absolute value of the voltage of the sustain pulse in the second period is below the absolute value of the discharge firing voltage of the discharge cell." As with claim 16, claim 20 is patentable over the cited references both because of its dependence on claim 19, and the failure of the cited references to address the recitations added by claim 20.

As with claims 17 and 18, claims 21 and 22 (because they contain similar recitations) are patentable both because they are dependent on patentable claims, and because they each add recitations not taught, suggested, or motivated by the cited references.

Claim 23 recites in part: "wherein immediately after a trailing edge of each sustain pulse which is applied to the discharge cell, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, to the discharge cell for a predetermined period that is no more than 100 ns."

The Office Action is silent in regard to how the cited references teach, suggest, or motivate application of a pulse having an opposite polarity immediately after a trailing edge of each sustain pulse. To the extent that the basis for rejecting claim 12 is applied to rejection of claim 23, the cited references are inadequate for the reasons provided in regard to claims 2 and 12.

The recitations of claim 25 are sufficiently similar to those of claims 23 and 14 that the inadequacies of the cited references identified in regard to those claims are equally applicable. As such, claim 25 is patentable over the cited references.

Claim 27 recites in part: "wherein when applying each sustain pulse between the pair of first and second electrodes, the driving circuit applies a first voltage between the pair of first and second electrodes for a fixed period from a leading edge of the sustain pulse, and applies a second voltage between the pair of first and second electrodes for a period from a lapse of the fixed period to a trailing edge of the sustain pulse, the second voltage having a smaller absolute value than the first voltage." As with claims 15 and 19, the cited references fail to teach, suggest, or motivate a sustain pulse having a higher initial voltage than the remainder of the pulse. As such, claim 27 is patentable over the cited references.

Claim 28 recites in part: "the driving circuit applies the first and second voltages between the pair of first and second electrodes, by applying two pulses that are same or opposite in polarity and overlap in time, respectively to the first electrode and the second electrode." The cited references do not teach, suggest, or motivate the use of voltage pulses overlapping in time to obtain a sustain pulse having a higher initial voltage. As such, claim 28 is patentable over the cited references.

Claim 29 recites in part: "wherein immediately after a trailing edge of each sustain pulse which is applied between the pair of first and second electrodes, the driving circuit applies a pulse that is opposite in polarity to the sustain pulse, between the pair of first and second electrodes for a predetermined period that is no more than 100 ns." This recitation is sufficiently similar to that of claims 2 and 12 that the inadequacies of the cited reference in regard to claims 2 and 12 are equally applicable to claim 29. As such, claim 29 is patentable over the cited references. Claim 13 is patentable at least because of its dependence on claim 12.

Claim 30 recites in part: "the sustain pulse and the pulse of the opposite polarity between the pair of first and second electrodes, by applying two pulses that are same in polarity and overlap in time, respectively to the first electrode and the second electrode". As such, claim 30 is patentable over the cited references both because of its dependence on claim 29, and, as with claim 28, because the cited references do not teach, suggest, or motivate the use of voltage pulses overlapping in time to obtain a sustain pulse having a higher initial voltage.

Claim 31, as with claims 2, 33, and 34, contains recitations not addressed by the Office Action. The recitations of claim 2 are sufficiently similar to those of claim 30 that the inadequacies of the cited references in regard to those recitations are equally applicable to those of claim 30. As such, claim 30 is patentable over the cited references.

The recitations of claim 32 are sufficiently similar to those of claim 7 that the inadequacies of the cited references in regard to claim 7 are equally applicable to claim 32. As such, claim 32 is patentable over the cited references.

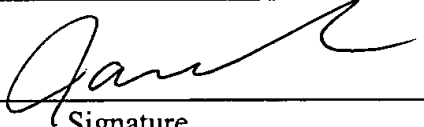
In regard to claim 33, it should be observed that the Office Action is silent in regard to how *Nagai* is supposed to satisfy the recitations of claim 33 but the rejection of claim 33 is lumped together with that of claim 1 which differs substantially from claim 33. As such, the Office Action provides no basis for the rejection of claim 33. Moreover, the cited references do not provide a proper basis for rejecting claim 33. The recitations of claim 33 are sufficiently similar to those of claim 15 that the inadequacies of the cited references in regard to claim 15 are equally applicable to claim 33. As such, claim 33 is patentable over the cited references.

In regard to claim 34, it should be observed that the Office Action is silent in regard to how *Nagai* is supposed to satisfy the recitations of claim 34 but the rejection of claim 34 is lumped together with that of claim 1 which differs substantially from claim 34. As such, the Office Action provides no basis for the rejection of claim 34. Moreover, the cited references do not provide a proper basis for rejecting claim 34. The recitations of claim 34 are sufficiently similar to those of claim 23 that the inadequacies of the cited references in regard to claim 23 are equally applicable to claim 33. As such, claim 33 is patentable over the cited references.

Applicant requests that future Office Actions take note of the fact that the waveforms depicted in *Miyazaki* that appear most similar to those claimed are current waveforms and not voltage waveforms, and the corresponding voltage waveforms are quite dissimilar. It should also be noted that although the waveforms stretch across a central axis, what is depicted are oscillograms and there is no indication that the axis represents a null voltage or current value.

It is believed that the case is now in condition for allowance, and an early notification of the same is requested. If the Examiner believes that a telephone interview will help further the prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

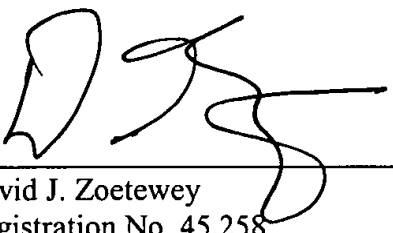
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By: James Lee

Signature

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Very truly yours,

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